

CLAIMS

What is claimed is:

- 1 1. A method of providing solutions to problems, the method comprising the steps of:
 - 2 generating problem definitions for problems;
 - 3 receiving environmental information required for generating solutions for
 - 4 the problems;
 - 5 generating solutions for the problems dependent upon the environmental
 - 6 information and the problem definitions;
 - 7 communicating solutions to clients before the solutions are needed.

- 1 2. The method of claim 1 wherein the problem definitions are for problems related
2 to securities trading.

- 1 3. The method of claim 1 further comprising storing the problem definitions in
2 problem definition records in a database.

- 1 4. The method of claim 1 further comprising storing the solutions in solutions
2 records in the database.

- 1 5. The method of claim 4 wherein the solutions records have at least one relation to
2 the problem definition records.

- 1 6. The method of claim 4 further comprising retrieving at least one solution from the
2 solutions records in the database.

- 1 7. The method of claim 1 wherein at least one client is a broker-dealer computer
2 system programmed and operated to effect securities trading.

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- 1 8. The method of claim 1 wherein received environmental information changes, the
2 method further comprising the steps of:
3 generating additional solutions dependent upon the changed
4 environmental information and the problem definitions; and
5 communicating additional solutions to clients before the additional
6 solutions are needed.
- 1 9. The method of claim 1 wherein problems are categorized according to type.
- 1 10. The method of claim 9 further comprising generating subscriptions for solutions,
2 the subscriptions comprising relations between clients and types of problems.
- 1 11. The method of claim 10 further comprising submitting a request for a
2 subscription.
- 1 12. The method of claim 11 further comprising creating a subscription record in
2 response to the submission of the request for a subscription.
- 1 13. The method of claim 12 wherein the subscription record comprises data elements
2 identifying a client and a problem type.
- 1 14. The method of claim 12 further comprising creating at least one problem
2 definition record dependent upon problem definition rules.
- 1 15. The method of claim 14 wherein the problem record comprises data elements
2 identifying problem type, side, symbol, and quantity.
- 1 16. The method of claim 15 wherein receiving environmental information comprises
2 receiving market information in the form of quotes, the quotes comprising data
3 elements further comprising side, symbol, quantity, market, and a tag.

- 1 17. The method of claim 16, wherein a quote is received, wherein the quote tag does
2 not indicate that the quote is closed, the method further comprising finding a
3 problem definition record having the same side and symbol as the quote.
- 1 18. The method of claim 17 further comprising searching for a solution record having
2 the same problem type, side, and symbol as the problem definition record having
3 the same side and symbol as the quote and the same market as the quote.
- 1 19. The method of claim 18 wherein the solution record is found, the method further
2 comprising updating the solution record with the price from the quote.
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- 1 20. The method of claim 18 wherein the solution record is not found, the method
2 further comprising creating a new solution record having the same problem type,
3 side, and symbol as the problem definition record having the same side and
4 symbol as the quote, the same market as the quote, and the same price as the
5 quote.
- 1 21. The method of claim 16, wherein a quote is received, wherein the quote tag
2 indicates that the quote is closed, the method further comprising deleting solution
3 records having the same side, symbol, and market as the quote.
- 1 22. The method of claim 14 further comprising repeatedly finding a subscription
2 record so that each existing subscription record is found in turn.
- 1 23. The method of claim 22, wherein at least one subscription record is found, the
2 method further comprising finding, for each found subscription record, a related
3 record of data communications parameters for the client identified in the found
4 subscription record.
- 1 24. The method of claim 23 further comprising finding, for each found subscription
2 record, at least one related problem definition record.

- 1 33. The method of claim 31 further comprising sending to at least one market at least
2 one solution order, the solution order comprising the side, symbol, quantity, price,
3 and market data elements from the found solution record.
- 1 34. A method of providing solutions for trading securities, the method comprising the
2 steps of:
3 receiving a level-two quote, the level-two quote comprising a symbol and
4 at least one market participant quote, the market participant quote
5 further comprising a quote price, a quote quantity, a quote MPID,
6 and a quote side;
7 creating in computer memory a solution set comprising at least one
8 solution record corresponding to each market participant quote in
9 the level-two quote, the solution record comprising a solution
10 symbol, a solution side, a solution MPID, a solution price, a
11 solution quantity, and a solution latency, the solution latency
12 comprising a latency for the market identified by the solution
13 MPID; and
14 sending the solution set to at least one client.
- 1 35. The method of claim 34, wherein the client comprises an automated system for
2 trading securities, the method further comprising the steps of:
3 storing the sent solution set in computer memory in the client system;
4 using at least one of the sent solution records to create orders for
5 securities; and
6 deleting from computer memory the used solution records.
- 1 36. The method of claim 35 wherein the client comprises more than one automated
2 system for trading securities and the automated systems for trading securities are
3 scaled.

1 37. The method of claim 34 wherein creating a solution set further comprises
2 recording in the solution record the solution side derived from the quote side, the
3 solution MPID derived from the quote MPID, the solution price derived from the
4 quote price, and the solution symbol derived from the symbol in the level-two
5 quote.

1 38. The method of claim 34 wherein creating a solution set further comprises the
2 steps of:

3 calculating the solution quantity for the solution record dependent upon
4 the quote quantity and dependent upon a hidden quantity ratio for the
5 market identified by the solution MPID; and
6 recording the solution quantity in the solution record.

1 39. The method of claim 38 wherein the hidden quantity ratio comprises a running
2 average of the ratios of order fill quantity to quote quantity, the order fill quantity
3 and the quote quantity being derived from trade data comprising descriptions of
4 executions of orders for securities.

1 40. The method of claim 38 wherein the hidden quantity ratio comprises a decaying
2 average of the ratios of order fill quantity to quote quantity, the order fill quantity
3 and the quote quantity being derived from trade data comprising descriptions of
4 executions of orders for securities.

1 41. The method of claim 38 wherein the hidden quantity ratio comprises a ratio of an
2 order fill quantity to a quote quantity, the order fill quantity and the quote quantity
3 being derived from trade data comprising descriptions of executions of orders for
4 securities.

1 42. The method of claim 34, wherein the solution set comprises at least two solution
2 records, the method further comprising sorting the solution records to yield sorted
3 solution records.

- 1 43. The method of claim 42 further comprising sorting the solution records according
2 to side.
- 1 44. The method of claim 42 further comprising sorting the solution records according
2 to price.
- 1 45. The method of claim 42 further comprising sorting the solution records according
2 to latency.
- 1 46. The method of claim 42 further comprising sorting the solution records according
2 to price and latency.
- 1 47. The method of claim 42 further comprising sorting the solution records according
2 to side, price, and latency.
- 1 48. The method of claim 42 further comprising deleting solution latency from the
2 sorted solution records.
- 1 49. The method of claim 34 further comprising creating an index for the solution set.
- 1 50. The method of claim 34 wherein the solution record further comprises a type
2 code.
- 1 51. The method of claim 34 wherein latency comprises the difference between the
2 time when a broker-dealer receives from a market a response to an order and the
3 time when the order was sent to the market.
- 1 52. A system for providing solutions to problems, the system comprising:
2 means for generating problem definitions for problems;
3 means for receiving environmental information required for generating
4 solutions for the problems;

5 means for generating solutions for the problems dependent upon the
6 environmental information and the problem definitions;
7 means for communicating solutions to clients before the solutions are
8 needed.

1 53. The system of claim 52 wherein the problem definitions are for problems related
2 to securities trading.

1 54. The system of claim 52 further comprising means for storing the problem
2 definitions in problem definition records in a database.

1 55. The system of claim 52 further comprising means for storing the solutions in
2 solutions records in the database.

1 56. The system of claim 55 wherein the solutions records have at least one relation to
2 the problem records.

1 57. The system of claim 55 further comprising means for retrieving at least one
2 solution from the solutions records in the database.

1 58. The system of claim 52 wherein at least one client is a broker-dealer computer
2 system programmed and operated to effect securities trading.

1 59. The system of claim 52 wherein received environmental information changes, the
2 system further comprising:
3 means for generating additional solutions dependent upon the changed
4 environmental information and the problem definitions; and
5 means for communicating additional solutions to clients before the
6 additional solutions are needed.

- 1 60. The system of claim 52 wherein problems are categorized according to type.
- 1 61. The system of claim 60 further comprising means for generating subscriptions for
2 solutions, the subscriptions comprising relations between clients and types of
3 problems.
- 1 62. The system of claim 61 further comprising means for submitting a request for a
2 subscription.
- 1 63. The system of claim 62 further comprising means for creating a subscription
2 record in response to the submission of the request for a subscription.
- 1 64. The system of claim 63 wherein the subscription record comprises data elements
2 identifying a client and a problem type.
- 1 65. The system of claim 63 further comprising means for creating at least one
2 problem definition record dependent upon problem definition rules.
- 1 66. The system of claim 65 wherein the problem record comprises data elements
2 identifying problem type, side, symbol, and quantity.
- 1 67. The system of claim 66 wherein means for receiving environmental information
2 comprises means for receiving market information in the form of quotes, the
3 quotes comprising data elements further comprising side, symbol, quantity,
4 market, and a tag.
- 1 68. The system of claim 67, wherein a quote is received, wherein the quote tag does
2 not indicate that the quote is closed, the system further comprising means for
3 finding a problem definition record having the same side and symbol as the quote.

- 1 69. The system of claim 68 further comprising means for searching for a solution
2 record having the same problem type, side, and symbol as the problem definition
3 record having the same side and symbol as the quote and the same market as the
4 quote.
- 1 70. The system of claim 69 wherein the solution record is found, the system further
2 comprising means for updating the solution record with the price from the quote.
- 1 71. The system of claim 69 wherein the solution record is not found, the system
2 further comprising means for creating a new solution record having the same
3 problem type, side, and symbol as the problem definition record having the same
4 side and symbol as the quote, the same market as the quote, and the same price as
5 the quote.
- 1 72. The system of claim 67, wherein a quote is received, wherein the quote tag
2 indicates that the quote is closed, the system further comprising means for
3 deleting solution records having the same side, symbol, and market as the quote.
- 1 73. The system of claim 65 further comprising means for repeatedly finding a
2 subscription record so that each existing subscription record is found in turn.
- 1 74. The system of claim 73, wherein at least one subscription record is found, the
2 system further comprising means for finding, for each found subscription record,
3 a related record of data communications parameters for the client identified in the
4 found subscription record.
- 1 75. The system of claim 74 further comprising means for finding, for each found
2 subscription record, at least one related problem definition record.

- 1 76. The system of claim 75, wherein at least one problem definition record is found,
2 the system further comprising means for finding, for each found problem
3 definition record, at least one related solution record.
 - 1 77. The system of claim 76 further comprising means for communicating, dependent
2 upon data communication parameters identified in the found record of data
3 communications parameters, to the client identified in the found subscription
4 record at least one data element of the found solution record.
 - 1 78. The system of claim 52 wherein means for communicating solutions to clients
2 comprises means for communicating solutions to an order processing system on a
3 broker-dealer computer.
 - 1 79. The system of claim 78 further comprising means for receiving at least one
2 customer order.
 - 1 80. The system of claim 79 wherein the customer order comprises data elements
2 identifying symbol, quantity, and optionally, price, market, and order type.
 - 1 81. The system of claim 80 wherein the customer order type has a relation to the
2 problem type.
 - 1 82. The system of claim 79 further comprising means for finding at least one solution
2 record having the same symbol as the received customer order and also having a
3 problem type related to the customer order type in the received customer order.
 - 1 83. The system of claim 82 further comprising means for sending to at least one
2 market at least one solution order, the solution order being dependent upon the
3 customer order and the data in the solution record.

1 84. The system of claim 82 further comprising means for sending to at least one
2 market at least one solution order, the solution order comprising the side, symbol,
3 quantity, price, and market data elements from the found solution record.

1 85. A system for providing solutions for trading securities, the system comprising:
2 means for receiving a level-two quote, the level-two quote comprising a
3 symbol and at least one market participant quote, the market
4 participant quote further comprising a quote price, a quote
5 quantity, a quote MPID, and a quote side;
6 means for creating in computer memory a solution set comprising at least
7 one solution record corresponding to each market participant quote
8 in the level-two quote, the solution record comprising a solution
9 symbol, a solution side, a solution MPID, a solution price, a
10 solution quantity, and a solution latency, the solution latency
11 comprising a latency for a market identified by the solution MPID;
12 and
13 means for sending the solution set to at least one client.

1 86. The system of claim 85, wherein the client comprises an automated system for
2 trading securities, the system further comprising:
3 means for storing the sent solution set in computer memory in the client;
4 means for creating, from at least one of the sent solution records, an order
5 for securities, wherein creating an order from the sent solution
6 record further comprises creating a used solution record; and
7 means for deleting from computer memory the used solution record.

1 87. The system of claim 85 wherein the client comprises more than one automated
2 system for trading securities and the automated systems for trading securities are
3 scaled.

1 88. The system of claim 85 wherein means for creating a solution set further
2 comprises means for recording in the solution record the solution side derived

3 from the quote side, the solution MPID derived from the quote MPID, the
4 solution price derived from the quote price, and the solution symbol derived from
5 the symbol in the level-two quote.

1 89. The system of claim 85 wherein means for creating a solution set further
2 comprises:

3 means for calculating the solution quantity for the solution record
4 dependent upon the quote quantity and dependent upon a hidden
5 quantity ratio for the market identified by the solution MPID; and
6 means for recording the solution quantity in the solution record.

1 90. The system of claim 89 wherein the hidden quantity ratio comprises a running
2 average of the ratios of order fill quantity to quote quantity, the order fill quantity
3 and the quote quantity being derived from trade data comprising descriptions of
4 executions of orders for securities.

1 91. The system of claim 89 wherein the hidden quantity ratio comprises a decaying
2 average of the ratios of order fill quantity to quote quantity, the order fill quantity
3 and the quote quantity being derived from trade data comprising descriptions of
4 executions of orders for securities.

1 92. The system of claim 89 wherein the hidden quantity ratio comprises a ratio of an
2 order fill quantity to a quote quantity, the order fill quantity and the quote quantity
3 being derived from trade data comprising descriptions of executions of orders for
4 securities.

1 93. The system of claim 85, wherein the solution set comprises at least two solution
2 records, the system further comprising means for sorting the solution records to
3 yield sorted solution records.

- 1 94. The system of claim 93 further comprising means for sorting the solution records
2 according to side.
- 1 95. The system of claim 93 further comprising means for sorting the solution records
2 according to price.
- 1 96. The system of claim 93 further comprising means for sorting the solution records
2 according to latency.
- 1 97. The system of claim 93 further comprising means for sorting the solution records
2 according to price and latency.
- 1 98. The system of claim 93 further comprising means for sorting the solution records
2 according to side, price, and latency.
- 1 99. The system of claim 93 further comprising means for deleting solution latency
2 from the sorted solution records.
- 1 100. The system of claim 85 further comprising means for creating an index for the
2 solution set.
- 1 101. The system of claim 85 wherein the solution record further comprises a type code.
- 1 102. The system of claim 85 wherein solution latency comprises the difference
2 between the time when a broker-dealer receives from a market a response to an
3 order and the time when the order was sent to the market.

1 103. A solutions server comprising:
2 a processor coupled to at least one source of environmental information
3 and coupled to at least one client, the processor programmed to:
4 generate problem definitions for problems;
5 receive environmental information required for generating
6 solutions for the problems;
7 generate solutions for the problems dependent upon the
8 environmental information and the problem definitions; and
9 communicate solutions to clients before the solutions are needed;
10 and
11 a memory coupled to the processor, the processor programmed to store in
12 the memory problem definitions and solutions.

- 1 104. The solutions server of claim 103 wherein the problem definitions are for
2 problems related to securities trading.
- 1 105. The solutions server of claim 103 further comprising computer memory in which
2 is stored the problem definitions.
- 1 106. The solution server of claim 105 wherein the problem definitions stored in
2 computer memory are stored in the form of problem definitions records in a
3 database.
- 1 107. The solutions server of claim 103 further comprising computer memory in which
2 is stored the solutions.
- 1 108. The solutions server of claim 107 wherein the solutions stored in computer
2 memory are stored in the form of solutions records in a database.

- 1 109. The solutions server of claim 108 wherein the processor is further programmed to
2 retrieve at least one solution record from the solutions records in the database.
- 1 110. The solutions server of claim 103 wherein at least one client is a broker-dealer
2 computer system programmed and operated to effect securities trading.
- 1 111. The solutions server of claim 103 wherein problems are categorized according to
2 type.
- 1 112. The solutions server of claim 111 wherein the processor is further programmed to
2 generate subscriptions for solutions.
- 1 113. The solutions server of claim 112 wherein the subscriptions comprise relations
2 between clients and types of problems.
- 1 114. The solutions server of claim 113 wherein the client has the capability of
2 submitting to the processor a request for a subscription.
- 1 115. The solutions server of claim 114 wherein the processor is further programmed to
2 create a subscription record in response to the submission of the request for a
3 subscription.
- 1 116. The solutions server of claim 115 wherein the subscription record comprises data
2 elements identifying a client and a problem type.
- 1 117. The solutions server of claim 115 wherein the processor is further programmed to
2 create at least one problem definition record dependent upon problem definition
3 rules.
- 1 118. The solutions server of claim 117 wherein the problem definition record
2 comprises data elements identifying problem type, side, symbol, and quantity.

- 1 119. The solutions server of claim 117 wherein environmental information comprises
2 market information in the form of quotes, the quotes further comprising data
3 elements identifying side, symbol, quantity, market, and a tag.
 - 1 120. The solutions server of claim 119, wherein a quote is received, wherein the quote
2 tag does not indicate that the quote is closed, the processor being further
3 programmed to find a problem definition record having the same side and symbol
4 as the quote.
 - 1 121. The solutions server of claim 120 wherein the processor is further programmed to
2 search for a solution record having the same problem type, side, and symbol as
3 the problem definition record having the same side and symbol as the quote and
4 the same market as the quote.
 - 1 122. The solutions server of claim 121, wherein the solution record is found, the
2 processor being further programmed to update the solution record with the price
3 from the quote.
 - 1 123. The solutions server of claim 122, wherein the solution record is not found, the
2 processor being further programmed to create a new solution record having the
3 same problem type, side, and symbol as the problem definition record having the
4 same side and symbol as the quote, the same market as the quote, and the same
5 price as the quote.
 - 1 124. The solutions server of claim 123, wherein a quote is received, wherein the quote
2 tag indicates that the quote is closed, the processor being further programmed to
3 delete solution records having the same side, symbol, and market as the quote.

- 1 125. The solutions server of claim 117 wherein the processor is further programmed to
2 repeatedly find a next subscription record so that each existing subscription record
3 is found in turn.
- 1 126. The solutions server of claim 125, wherein at least one subscription record is
2 found, the processor being further programmed to find, for each found
3 subscription record, a related record of data communications parameters for the
4 client identified in the found subscription record.
- 1 127. The solutions server of claim 126 wherein the processor is further programmed to
2 find, for each found subscription record, at least one related problem definition
3 record.
- 1 128. The solutions server of claim 127, wherein at least one problem definition record
2 is found, the processor being further programmed to find, for each found problem
3 definition record, at least one related solution record.
- 1 129. The solutions server of claim 128, wherein a data communications parameters
2 record is found, wherein the processor is further programmed to communicate,
3 dependent upon data communication parameters identified in the found record of
4 data communications parameters, to the client identified in the found subscription
5 record at least one data element of the found solution record.
- 1 130. The solutions server of claim 103 wherein the processor programmed to
2 communicate solutions to clients further comprises the processor programmed to
3 communicate solutions to at least one order processing system on a broker-dealer
4 computer.
- 1 131. The solutions server of claim 130 wherein the processor is further programmed to
2 receive at least one customer order.

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- 1 132. The solutions server of claim 131 wherein the customer order comprises data
2 elements identifying symbol, quantity, and optionally, price, market, and order
3 type.
- 1 133. The solutions server of claim 132 wherein the customer order type has a relation
2 to a problem type.
- 1 134. The solutions server of claim 133 wherein the processor is further programmed to
2 find at least one solution record having the same symbol as the received customer
3 order and also having a problem type related to the customer order type in the
4 received customer order.
- 1 135. The solutions server of claim 134 wherein the processor is further programmed to
2 send to at least one market at least one solution order, the solution order being
3 dependent upon the customer order and the data in the solution record.
- 1 136. The solutions server of claim 135 wherein the processor is further programmed to
2 send to at least one market at least one solution order, the solution order
3 comprising the side, symbol, quantity, price, and market data elements from the
4 found solution record.
- 1 137. A system for providing solutions for trading securities, the system comprising:
2 a processor coupled to at least one source of quotes and coupled to at least
3 one client, the processor programmed to:
4 receive at least one level-two quote, the level-two quote
5 comprising a symbol and at least one market participant
6 quote, the market participant quote comprising a quote
7 price, a quote quantity, a quote MPID, and a quote side;
8 create a solution set comprising at least one solution record
9 corresponding to each market participant quote, the
10 solution record comprising a solution symbol, a solution

side, a solution MPID, a solution price, a solution quantity, and a solution latency, the solution latency comprising a latency for the market identified by the solution MPID; and the solution set to a client; and

a memory coupled to the processor, the processor programmed to store the solution set in the memory.

- 1 138. The system of claim 137, wherein the client comprises an automated system for
2 trading securities, the system further comprising a client processor coupled to
3 client memory, the client processor programmed to:

store the sent solution set in client memory;

create, dependent upon the sent solution records, orders for securities; and send the orders for securities to markets.

- 1 139. The system of claim 137 wherein the client comprises more than one automated
2 system for trading securities and the automated systems for trading securities are
3 scaled.

- 1 140. The system of claim 137 wherein the processor is further programmed to record
2 in the solution set the solution side derived from the quote side, the solution
3 MPID derived from the quote MPID, the solution price derived from the quote
4 price, and the solution symbol derived from the symbol in the level-two quote.

- 1 141. The system of claim 137 wherein the processor is further programmed to:
2 calculate the solution quantity dependent upon the quote and dependent
3 upon a hidden quantity ratio; and
4 record the solution quantity in the solution record.

- 1 142. The system of claim 141 wherein the hidden quantity ratio comprises a running
2 average of the ratios of order fill quantity to quote quantity, the order fill quantity
3 and the quote quantity being derived from trade data comprising descriptions of
4 executions of orders for securities.
- 1 143. The system of claim 141 wherein the hidden quantity ratio comprises a decaying
2 average of the ratios of order fill quantity to quote quantity, the order fill quantity
3 and the quote quantity being derived from trade data comprising descriptions of
4 executions of orders for securities.
- 1 144. The system of claim 141 wherein the hidden quantity ratio comprises a ratio of an
2 order fill quantity to a quote quantity, the order fill quantity and the quote quantity
3 being derived from trade data comprising descriptions of executions of orders for
4 securities.
- 1 145. The system of claim 137, wherein the solution set comprises at least two solution
2 records, the processor being further programmed the solution records to yield a
3 sorted solution set.
- 1 146. The system of claim 145 wherein the processor is further programmed to sort the
2 solution records according to side.
- 1 147. The system of claim 145 wherein the processor is further programmed to sort the
2 solution records according to price.
- 1 148. The system of claim 145 wherein the processor is further programmed to sort the
2 solution records according to latency.
- 1 149. The system of claim 145 wherein the processor is further programmed to sort the
2 solution records according to price and latency.

1 150. The system of claim 145 wherein the processor is further programmed to sort the
2 solution records according to side, price, and latency.

1 151. The system of claim 145 wherein the processor is further programmed to delete
2 solution latency from the sorted solution records.

1 152. The system of claim 137 wherein the processor is further programmed to create
2 an index for the solution set.

1 153. The system of claim 137 wherein the solution record further comprises a type
2 code.

1 154. The system of claim 137 wherein latency comprises the difference between the
2 time when a broker-dealer receives from a market a response to an order and the
3 time when the order was sent to the market.

1 155. A method of providing an improved level-two quote for trading securities, the
2 method comprising the steps of:

receiving in an automated system, which system comprises at least one computer processor coupled to computer memory, a level-two quote, the level-two quote comprising a data format further comprising a symbol and at least one market participant quote, the market participant quote further comprising a data format further comprising a quote price, a quote quantity, a quote MPID, and a quote side; and

10 creating in computer memory, dependent upon the level-two quote, an
11 improved level-two quote comprising a symbol and at least one
12 improved market participant quote, which improved market
13 participant quote comprises a side, an MPID, a price, a quantity
14 dependent upon the market participant quote quantity and also

15 dependent upon a hidden quantity ratio, and a latency, the latency
16 comprising a latency for the market identified by the MPID; and
17 providing the improved level-two quote to clients.

- 1 156. The method of claim 155 wherein the improved level-two quote comprises at least
2 two improved market participant quotes and the improved market participant
3 quotes are sorted.
157. The method of claim 155 wherein providing the improved level-two quote to
clients comprises providing improved level-two quotes to clients in the form of
streaming serial data provided by use of means for data communications.